A TRIPLER TO 220 GHz USING A BACK-TO-BACK BARRIER-N-N$^+$ VARACTOR DIODE

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ABSTRACT

The back-to-back barrier-N-N+ (bbBNN) varactor is a nonlinear device being developed for frequency multiplier applications above 100 GHz. Its symmetric CV characteristics, low series resistance and suitability to planarization make it an ideal choice for high frequency, low power, odd harmonic generation.

In this paper, the performance of a 220 GHz tripler using discrete and integrated planar bbBNN devices is presented. A new split-waveguide block design has been used to provide the proper embedding impedances to the device. The performance over 210-230 GHz has been measured and the bbBNN device is shown to provide as much as 7% conversion efficiency and as much as 734 microwatt output power. This is believed to be the highest conversion efficiency yet reported for an all planar tripler at this frequency. The performance is expected to be improved further with minor changes to the device and circuit parameters.

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